

# **APPENDIX B**

## **Air Quality, Greenhouse Gases, and Energy Calculations**

## **APPENDIX B: AIR QUALITY, GREENHOUSE GASES, & ENERGY CALCULATIONS**

### **METHODOLOGY**

#### **Air Quality and Greenhouse Gases**

##### ***Offroad Equipment***

Emissions would be generated from a variety of offroad equipment during construction. Daily emissions are based on the total amount of equipment usage on daily basis. Emissions were estimated using CalEEMod. Below shows the calculation method for estimating emissions from offroad equipment.

Daily Emissions = # of Equipment x Daily Usage x Emission Factor x Horsepower x Load Factor x Conversion Factor

- Daily Emissions= lbs/day
- # of Equipment= unitless
- Daily Usage=hours/day
- Emission Factor= grams/hp-hour
- Horsepower= hp
- Load Factor= unitless
- Conversion Factor= 1 lb/453.6 grams

##### **Mobile Sources**

Haul truck emissions were estimated using the latest edition of the California Air Resources Board Emission FACTor model, version 2017 (EMFAC2017). Criteria pollutant and GHG emissions were estimated for various processes of vehicle trips including: onroad travel emissions, starting emissions, and idling emissions. Mobile emissions were calculated outside of CalEEMod, but used CalEEMod calculation methods. Fugitive dust emission factors for tire wear, brake wear, and road surfaces were included in the analysis. Below provides methodology for estimating emissions from these processes.

##### ***Onroad Travel Emissions***

Onroad Emissions= Daily Truck Trips x Trip Length x Emission Factor x Conversion Factor

- Onroad Emissions= lbs/day
- Daily Truck Trips= truck trips/day
- Trip Length: miles/trip
- Emission Factor: grams/mile
- Conversion Factor: 1lb/453.6 grams

##### ***Starting Emissions***

Starting Emissions= Daily Truck Trips x Emission Factor x Conversion Factor

- Onroad Emissions= lbs/day
- Daily Truck Trips= truck trips/day
- Pollutant Emission Factor: grams/trip
- Conversion Factor: 1 lb/453.6 grams



### *Idling Emissions*

Idling Emissions= Daily Truck Trips x Emission Factor x Conversion Factor

- Onroad Emissions= lbs/day
- Daily Truck Trips= truck trips/day
- Emission Factor: grams/trip
- Conversion Factor: 1 lb/453.6 grams

### **Grading**

CalEEMod has designated specific types of equipment used in grading activities that can generate fugitive dust emissions. The type of equipment responsible for fugitive dust emissions during grading activities are crawler tractors, graders, rubber tired dozers, and scrapers. Although the Project would not include grading activities, the analysis would include a crawler tractor. CalEEMod incorporates dust calculation methods from EPA AP-42 Emission Factors, Section 11.9, Western Surface Coal Mining. The analysis estimated fugitive dust emissions from daily operation of the crawler tractor consistent with CalEEMod methodology.

Daily Emissions = Emission Factor x Vehicle Miles Traveled

- Daily Emissions= lb/day
- Emission Factor= lb/VMT
- Vehicle Miles Traveled (VMT) = miles

$VMT = A_s \times W_b \times 43,560 \text{ (ft}^2\text{/acre)} / 5,280 \text{ (ft/mile)}$

- VMT= miles
- $A_s$ = acreage of grading site
- $W_b$ = blade width (CalEEMod default value of 12 feet)

### Emission Factor

$EF_{PM15} = 0.051 \times (S)^{2.0}$ ;  $EF_{PM10} = EF_{PM15} \times F_{PM10}$

$EF_{TSP} = 0.04 \times (S)^{2.5}$ ;  $EF_{PM2.5} = EF_{TSP} \times F_{PM2.5}$

- EF= emission factor (lb/VMT)
- S= mean vehicle speed in mile per hour (mph), default is 7.1 mph.
- $F_{PM2.5}$ = PM2.5 Scaling factor, default is 0.031
- $F_{PM10}$ = PM10 Scaling factor, default is 0.6

**Zayo Construction Assumptions**

Duration: 6 months  
 Up to 5 workdays per week  
 Daily workday: 7AM-7PM

**For a daily emissions threshold:**

**Worst-case day assumption:** All crews for each installation method and 1 bridge crew would operate on same day

**For an annual emissions threshold:**

If annual emissions are required, annual emissions from each installation method will be based on total # of workdays per construction activity.

Start	End	Workdays in 6 months
6/1/2020	12/31/2020	154

\*Not acutal schedule, only used to represent 6-month duration

Construction Activity	% of Project Duration	# of Workdays
Plowing In Method	90%	139
Open Trenching	25%	39
Directional Boring	97%	150
Bridge Attachments	97%	150
Blowing/Splicing	66%	102

**Installation Method Distribution**

Total Miles of Cable		
193		
Method	Miles	% of Total Miles
1) Plowing In Method	154.4	80.0%
2) Open Trenching	19.3	10.0%
3) Directional Boring	19.3	10.0%

**1) Plowing In Method**

**Crew #1**

Construction Equipment	CalEEMod Equipment Type	# of Equipment	Equipment Usage (Hours/Day)
Cable Plow	Crawler Tractors	1	10
Water Truck	Off-Highway Trucks	1	10
Mini Excavators	Excavators	1	10
Mini Excavators	Excavators	1	10
Backhoes	Tractors/Loaders/Backhoes	1	10
Lowboy Tractor Trailer	HHDT	1	10

**Mobile**

Truck Type	EMFAC Vehicle Category	# of Trucks	Trips/day (In/Out)	One-Way Trip Length (miles)
F-350, F-450	LHDT2	3	6	30
Lowboy Tractor Trailer	HHDT	1	2	30

**Crew #2**

Construction Equipment	CalEEMod Equipment Type	# of Equipment	Equipment Usage (Hours/Day)
Cable Plow	Crawler Tractors	1	10
Water Truck	Off-Highway Trucks	1	10
Mini Excavators	Excavators	1	10
Mini Excavators	Excavators	1	10
Backhoes	Tractors/Loaders/Backhoes	1	10
Lowboy Tractor Trailer	HHDT	0	10

**Mobile**

Truck Type	EMFAC Vehicle Category	# of Trucks	Trips/day (In/Out)	One-Way Trip Length (miles)
F-350, F-450	LHDT2	3	6	30
Lowboy Tractor Trailer	HHDT	1	2	30

**1) Plowing In Method**

**Crew #3**

Construction Equipment	CalEEMod Equipment Type	# of Equipment	Equipment Usage (Hours/Day)
Cable Plow	Crawler Tractors	1	10
Water Truck	Off-Highway Trucks	1	10
Mini Excavators	Excavators	1	10
Mini Excavators	Excavators	1	10
Backhoes	Tractors/Loaders/Backhoes	1	10
Lowboy Tractor Trailer	HHDT	0	10

**Mobile**

Truck Type	EMFAC Vehicle Category	# of Trucks	Trips/day (In/Out)	One-Way Trip Length (miles)
F-350, F-450	LHDT2	3	6	30
Lowboy Tractor Trailer	HHDT	1	2	30

**2) Open Trench**

**Crew #1**

Construction Equipment	CalEEMod Equipment Type	# of Equipment	Equipment Usage (Hours/Day)
Minis 10K-24K	Excavators	2	10
Dozer/loaders/trenching	Tractors/Loaders/Backhoes	2	10

**Mobile**

Truck Type	EMFAC Vehicle Category	# of Trucks	Trips/day (In/Out)	One-Way Trip Length (miles)
F-350, F-450	LHDT2	3	6	30

**Crew #2**

Construction Equipment	CalEEMod Equipment Type	# of Equipment	Equipment Usage (Hours/Day)
Minis 10K-24K	Excavators	2	10
Dozer/loaders/trenching	Tractors/Loaders/Backhoes	2	10

**Mobile**

Truck Type	EMFAC Vehicle Category	# of Trucks	Trips/day (In/Out)	One-Way Trip Length (miles)
F-350, F-450	LHDT2	3	6	30

**3) Directional Boring**

Total # of Boring Locations	Days per boring location	Total Days with 4 Crews
300	2	150

**Crew #1**

Construction Equipment	CalEEMod Equipment Type	# of Equipment	Equipment Usage (Hours/Day)
Drill Rig	Bore/Drill Rigs	1	10
Support Equipment	Tractors/Loaders/Backhoes	1	10

**Mobile**

Truck Type	EMFAC Vehicle Category	# of Trucks	Trips/day (In/Out)	One-Way Trip Length (miles)
F-350, F-450	LHDT2	2	4	30
Vac Truck	HHDT	1	2	30
2T Truck	HHDT	1	2	30

**Crew #2**

Construction Equipment	CalEEMod Equipment Type	# of Equipment	Equipment Usage (Hours/Day)
Drill Rig	Bore/Drill Rigs	1	10
Support Equipment	Tractors/Loaders/Backhoes	1	10

**Mobile**

Truck Type	EMFAC Vehicle Category	# of Trucks	Trips/day (In/Out)	One-Way Trip Length (miles)
F-350, F-450	LHDT2	2	4	30
Vac Truck	HHDT	1	2	30
2T Truck	HHDT	1	2	30

**3) Directional Boring**

**Crew #3**

Construction Equipment	CalEEMod Equipment Type	# of Equipment	Equipment Usage (Hours/Day)
Drill Rig	Bore/Drill Rigs	1	10
Support Equipment	Tractors/Loaders/Backhoes	1	10

**Mobile**

Truck Type	EMFAC Vehicle Category	# of Trucks	Trips/day (In/Out)	One-Way Trip Length (miles)
F-350, F-450	LHDT2	2	4	30
Vac Truck	HHDT	1	2	30
2T Truck	HHDT	1	2	30

**Crew #4**

Construction Equipment	CalEEMod Equipment Type	# of Equipment	Equipment Usage (Hours/Day)
Drill Rig	Bore/Drill Rigs	1	10
Support Equipment	Tractors/Loaders/Backhoes	1	10

**Mobile**

Truck Type	EMFAC Vehicle Category	# of Trucks	Trips/day (In/Out)	One-Way Trip Length (miles)
F-350, F-450	LHDT2	2	4	30
Vac Truck	HHDT	1	2	30
2T Truck	HHDT	1	2	30



**Bridge Attachments**

Number of Bridges	Days per Bridge	Total Days		
30	5	150		
Construction Equipment	CalEEMod Equipment Type	# of Equipment	Equipment Usage (Hours/Day)	
Excavator	Excavators	1	10	
<b>Mobile</b>				
Truck Type	EMFAC Vehicle Category	# of Trucks	Trips/day (In/Out)	One-Way Trip Length (miles)
F-350, F-450	LHDT2	2	4	30
Bridge Truck	HHDT	1	2	30
Lowboy Tractor Trailer	HHDT	1	2	30

**Blowing Fiber/Splicing (Occurs after all conduit is installed)**

Construction Equipment	CalEEMod Equipment Type	# of Equipment	Equipment Usage (Hours/Day)	
Air Compressor	Air Compressors	6	10	
<b>Mobile</b>				
Truck Type	EMFAC Vehicle Category	# of Trucks	Trips/day (In/Out)	One-Way Trip Length (miles)
F-350, F-450	LHDT2	6	12	30

**Blowing/Splicing Installation**

Cable installation (miles)	Cable Installation (feet)	Cable Blowing Rate (ft/day)	Workdays
193	1019040	10,000	102

**Emissions Summary**

Unmitigated	Daily Emissions (lb/day)		
	Source	ROG	NOX
Offroad	12.44	131.37	7.85
Mobile	1.04	23.40	2.59
Grading Dust	0.00	0.00	0.78
<b>Total</b>	<b>13.49</b>	<b>154.77</b>	<b>11.22</b>
PCAPCD Threshold	82	82	82
<b>Exceeds Threshold?</b>	<b>No</b>	<b>Yes</b>	<b>No</b>

Mitigated	Daily Emissions (lb/day)		
	Source	ROG	NOX
Offroad	4.86	27.42	3.42
Mobile	1.04	23.40	2.59
Grading Dust	0.00	0.00	0.78
<b>Total</b>	<b>5.91</b>	<b>50.82</b>	<b>6.79</b>
PCAPCD Threshold	82	82	82
<b>Exceeds Threshold</b>	<b>No</b>	<b>No</b>	<b>No</b>

Notes:

Placer County Air Pollution Control District (PCAPCD)  
<https://www.placer.ca.gov/1804/CEQA-Thresholds>

**Global Warming Potentials<sup>1</sup>**

CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O
1	28	265

**GHG Summary**

Source Category	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e
Offroad	1445.12	0.44	0.00	1457.31
Mobile	336.23	0.00	0.05	350.31
<b>Totals</b>	<b>1781.34</b>	<b>0.44</b>	<b>0.05</b>	<b>1807.62</b>
<b>30-Year Amortization</b>				<b>60.25</b>
PCAPCD Threshold <sup>2</sup>				10,000
<b>Exceeds Threshold?</b>				No

## Notes:

1. Global Warming Potentials based on IPCC AR5 Values

[https://www.ghgprotocol.org/sites/default/files/ghgp/Global-Warming-Potential-Values%20%28Feb%2016%202016%29\\_1.pdf](https://www.ghgprotocol.org/sites/default/files/ghgp/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_1.pdf)

2. Placer County Air Pollution Control District (PCAPCD)

<https://www.placer.ca.gov/1804/CEQA-Thresholds>

**Offroad Emissions**

Scenario	Daily Emissions (lb/day)									
	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Unmitigated	12.4435	131.3698	110.3447	0.2397	1.9885	5.861	7.8495	0.2147	5.3921	5.6068
Mitigated	4.8626	27.4155	143.0056	0.2397	1.9885	1.4348	3.4233	0.2147	1.4348	1.6495

\*Only Summer output file used since offroad construction emissions do not vary with season.

Mobile Emissions					RUNNING Emission Factors (g/mi)												
					ROG	NOX	CO	SOX	PM10 Fugitive	PM10 Exhaust	PM10 Total	PM2.5 Fugitive	PM2.5 Exhaust	PM2.5 Total	CO2	CH4	N2O
Construction Activity	Total Workdays	# of Truck Trips/day	Trip Length (miles)	EMFAC Vehicle Category	ROG	NOX	CO	SOX	PM10 Fugitive	PM10 Exhaust	PM10 Total	PM2.5 Fugitive	PM2.5 Exhaust	PM2.5 Total	CO2	CH4	N2O
Plowing In Method	139	6	30	HHDT	1.55E-01	6.94E+00	5.75E-01	1.56E-02	3.95E-01	8.06E-02	4.75E-01	1.08E-01	7.71E-02	1.85E-01	1.65E+03	7.20E-03	2.60E-01
Plowing In Method	139	18	30	LHDT2	1.82E-01	2.66E+00	8.70E-01	6.20E-03	4.01E-01	3.20E-02	4.33E-01	1.15E-01	3.06E-02	1.45E-01	6.56E+02	8.46E-03	1.03E-01
Open Trenching	39	12	30	LHDT2	1.82E-01	2.66E+00	8.70E-01	6.20E-03	4.01E-01	3.20E-02	4.33E-01	1.15E-01	3.06E-02	1.45E-01	6.56E+02	8.46E-03	1.03E-01
Directional Boring	150	16	30	HHDT	1.55E-01	6.94E+00	5.75E-01	1.56E-02	3.95E-01	8.06E-02	4.75E-01	1.08E-01	7.71E-02	1.85E-01	1.65E+03	7.20E-03	2.60E-01
Directional Boring	150	16	30	LHDT2	1.82E-01	2.66E+00	8.70E-01	6.20E-03	4.01E-01	3.20E-02	4.33E-01	1.15E-01	3.06E-02	1.45E-01	6.56E+02	8.46E-03	1.03E-01
Bridge Attachments	150	4	30	HHDT	1.55E-01	6.94E+00	5.75E-01	1.56E-02	3.95E-01	8.06E-02	4.75E-01	1.08E-01	7.71E-02	1.85E-01	1.65E+03	7.20E-03	2.60E-01
Bridge Attachments	150	4	30	LHDT2	1.82E-01	2.66E+00	8.70E-01	6.20E-03	4.01E-01	3.20E-02	4.33E-01	1.15E-01	3.06E-02	1.45E-01	6.56E+02	8.46E-03	1.03E-01
Blowing/Splicing	102	12	30	LHDT2	1.82E-01	2.66E+00	8.70E-01	6.20E-03	4.01E-01	3.20E-02	4.33E-01	1.15E-01	3.06E-02	1.45E-01	6.56E+02	8.46E-03	1.03E-01
					RUNNING Emissions (lb/day)												
Construction Activity	Total Workdays	# of Truck Trips/day	Trip Length (miles)	EMFAC Vehicle Category	ROG	NOX	CO	SOX	PM10 Fugitive	PM10 Exhaust	PM10 Total	PM2.5 Fugitive	PM2.5 Exhaust	PM2.5 Total	CO2	CH4	N2O
Plowing In Method	139	6	30	HHDT	6.15E-02	2.75E+00	2.28E-01	6.19E-03	1.57E-01	3.20E-02	1.89E-01	4.29E-02	3.06E-02	7.35E-02	6.56E+02	2.86E-03	1.03E-01
Plowing In Method	139	18	30	LHDT2	2.17E-01	3.16E+00	1.04E+00	7.38E-03	4.77E-01	3.80E-02	5.15E-01	1.37E-01	3.64E-02	1.73E-01	7.81E+02	1.01E-02	1.23E-01
Open Trenching	39	12	30	LHDT2	1.45E-01	2.11E+00	6.90E-01	4.92E-03	3.18E-01	2.54E-02	3.44E-01	9.11E-02	2.43E-02	1.15E-01	5.21E+02	6.71E-03	8.18E-02
Directional Boring	150	16	30	HHDT	1.64E-01	7.34E+00	6.08E-01	1.65E-02	4.18E-01	8.53E-02	5.03E-01	1.14E-01	8.16E-02	1.96E-01	1.75E+03	7.62E-03	2.75E-01
Directional Boring	150	16	30	LHDT2	1.93E-01	2.81E+00	9.21E-01	6.56E-03	4.24E-01	3.38E-02	4.58E-01	1.22E-01	3.23E-02	1.54E-01	6.94E+02	8.95E-03	1.09E-01
Bridge Attachments	150	4	30	HHDT	4.10E-02	1.84E+00	1.52E-01	4.13E-03	1.04E-01	2.13E-02	1.26E-01	2.86E-02	2.04E-02	4.90E-02	4.37E+02	1.91E-03	6.87E-02
Bridge Attachments	150	4	30	LHDT2	4.82E-02	7.03E-01	2.30E-01	1.64E-03	1.06E-01	8.45E-03	1.15E-01	3.04E-02	8.09E-03	3.85E-02	1.74E+02	2.24E-03	2.73E-02
Blowing/Splicing	102	4	30	LHDT2	1.45E-01	2.11E+00	6.90E-01	4.92E-03	3.18E-01	2.54E-02	3.44E-01	9.11E-02	2.43E-02	1.15E-01	5.21E+02	6.71E-03	8.18E-02
					<b>1.01E+00</b>	<b>2.28E+01</b>	<b>4.56E+00</b>	<b>5.23E-02</b>	<b>2.32E+00</b>	<b>2.70E-01</b>	<b>2.59E+00</b>	<b>6.57E-01</b>	<b>2.58E-01</b>	<b>9.15E-01</b>	<b>5.53E+03</b>	<b>4.71E-02</b>	<b>8.69E-01</b>

Mobile Emissions																	
Daily Emissions (lb/day)																	
ROG	NOX	CO	SOX	PM10 Fugitive	PM10 Exhaust	PM10 Total	PM2.5 Fugitive	PM2.5 Exhaust	PM2.5 Total	CO2	CH4	N2O					
1.04	23.40	4.88	0.05	2.32	0.27	2.59	0.66	0.26	0.92	5600.68	0.05	0.88					

Notes:

Emission factors from CARB's EMFAC2017, Lassen County, Calendar Year 2020; LHDT2 & HHDT; Diesel

Annual Emissions (lb/year)		
CO2	CH4	N2O
741255.47	6.05	116.52
Annual Emissions (MT/year)		
336.22822	0.002743	0.05285

Mobile Emissions					NON-RUNNING Emission Factor (g/trip)												
					ROG	NOX	CO	SOX	PM10 Fugitive	PM10 Exhaust	PM10 Total	PM2.5 Fugitive	PM2.5 Exhaust	PM2.5 Total	CO2	CH4	N2O
Construction Activity	Total Workdays	# of Truck Trips/day	Trip Length (miles)	EMFAC Vehicle Category	ROG	NOX	CO	SOX	PM10 Fugitive	PM10 Exhaust	PM10 Total	PM2.5 Fugitive	PM2.5 Exhaust	PM2.5 Total	CO2	CH4	N2O
Plowing In Method	139	6	30	HHDT	0.00E+00	2.06E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Plowing In Method	139	18	30	LHDT2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Open Trenching	39	12	30	LHDT2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Directional Boring	150	16	30	HHDT	0.00E+00	2.06E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Directional Boring	150	16	30	LHDT2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Bridge Attachments	150	4	30	HHDT	0.00E+00	2.06E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Bridge Attachments	150	4	30	LHDT2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Blowing/Splicing	102	12	30	LHDT2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
					NON-RUNNING Emissions (lb/day)												
Construction Activity	Total Workdays	# of Truck Trips/day	Trip Length (miles)	EMFAC Vehicle Category	ROG	NOX	CO	SOX	PM10 Fugitive	PM10 Exhaust	PM10 Total	PM2.5 Fugitive	PM2.5 Exhaust	PM2.5 Total	CO2	CH4	N2O
Plowing In Method	139	6	30	HHDT	0.00E+00	2.72E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Plowing In Method	139	18	30	LHDT2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Open Trenching	39	12	30	LHDT2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Directional Boring	150	16	30	HHDT	0.00E+00	7.27E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Directional Boring	150	16	30	LHDT2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Bridge Attachments	150	4	30	HHDT	0.00E+00	1.82E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Bridge Attachments	150	4	30	LHDT2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Blowing/Splicing	102	4	30	LHDT2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
					0.00E+00	1.18E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Notes:

Emission factors from CARB's EMFAC2017, Lassen County, Calendar Year 2020; LHDT2 & HHDT; Diesel

Mobile Emissions					IDLING Emission Factors (g/trip)												
					ROG	NOX	CO	SOX	PM10 Fugitive	PM10 Exhaust	PM10 Total	PM2.5 Fugitive	PM2.5 Exhaust	PM2.5 Total	CO2	CH4	N2O
Construction Activity	Total Workdays	# of Truck Trips/day	Trip Length (miles)	EMFAC Vehicle Category	ROG	NOX	CO	SOX	PM10 Fugitive	PM10 Exhaust	PM10 Total	PM2.5 Fugitive	PM2.5 Exhaust	PM2.5 Total	CO2	CH4	N2O
Plowing In Method	139	6	30	HHDT	4.87E-01	7.62E+00	5.50E+00	1.11E-02	0.00E+00	2.19E-02	2.19E-02	0.00E+00	2.09E-02	2.09E-02	1.17E+03	2.26E-02	1.85E-01
Plowing In Method	139	18	30	LHDT2	8.73E-03	2.00E-01	7.23E-02	1.70E-04	0.00E+00	2.13E-03	2.13E-03	0.00E+00	2.04E-03	2.04E-03	1.80E+01	4.05E-04	2.83E-03
Open Trenching	39	12	30	LHDT2	8.73E-03	2.00E-01	7.23E-02	1.70E-04	0.00E+00	2.13E-03	2.13E-03	0.00E+00	2.04E-03	2.04E-03	1.80E+01	4.05E-04	2.83E-03
Directional Boring	150	16	30	HHDT	4.87E-01	7.62E+00	5.50E+00	1.11E-02	0.00E+00	2.19E-02	2.19E-02	0.00E+00	2.09E-02	2.09E-02	1.17E+03	2.26E-02	1.85E-01
Directional Boring	150	16	30	LHDT2	8.73E-03	2.00E-01	7.23E-02	1.70E-04	0.00E+00	2.13E-03	2.13E-03	0.00E+00	2.04E-03	2.04E-03	1.80E+01	4.05E-04	2.83E-03
Bridge Attachments	150	4	30	HHDT	4.87E-01	7.62E+00	5.50E+00	1.11E-02	0.00E+00	2.19E-02	2.19E-02	0.00E+00	2.09E-02	2.09E-02	1.17E+03	2.26E-02	1.85E-01
Bridge Attachments	150	4	30	LHDT2	8.73E-03	2.00E-01	7.23E-02	1.70E-04	0.00E+00	2.13E-03	2.13E-03	0.00E+00	2.04E-03	2.04E-03	1.80E+01	4.05E-04	2.83E-03
Blowing/Splicing	102	12	30	LHDT2	8.73E-03	2.00E-01	7.23E-02	1.70E-04	0.00E+00	2.13E-03	2.13E-03	0.00E+00	2.04E-03	2.04E-03	1.80E+01	4.05E-04	2.83E-03
					IDLING Emissions (lb/day)												
Construction Activity	Total Workdays	# of Truck Trips/day	Trip Length (miles)	EMFAC Vehicle Category	ROG	NOX	CO	SOX	PM10 Fugitive	PM10 Exhaust	PM10 Total	PM2.5 Fugitive	PM2.5 Exhaust	PM2.5 Total	CO2	CH4	N2O
Plowing In Method	139	6	30	HHDT	6.44E-03	1.01E-01	7.27E-02	1.47E-04	0.00E+00	2.89E-04	2.89E-04	0.00E+00	2.77E-04	2.77E-04	1.55E+01	2.99E-04	2.44E-03
Plowing In Method	139	18	30	LHDT2	3.46E-04	7.93E-03	2.87E-03	6.76E-06	0.00E+00	8.44E-05	8.44E-05	0.00E+00	8.08E-05	8.08E-05	7.16E-01	1.61E-05	1.12E-04
Open Trenching	39	12	30	LHDT2	2.31E-04	5.28E-03	1.91E-03	4.51E-06	0.00E+00	5.63E-05	5.63E-05	0.00E+00	5.39E-05	5.39E-05	4.77E-01	1.07E-05	7.50E-05
Directional Boring	150	16	30	HHDT	1.72E-02	2.69E-01	1.94E-01	3.91E-04	0.00E+00	7.71E-04	7.71E-04	0.00E+00	7.38E-04	7.38E-04	4.14E+01	7.97E-04	6.51E-03
Directional Boring	150	16	30	LHDT2	3.08E-04	7.05E-03	2.55E-03	6.01E-06	0.00E+00	7.51E-05	7.51E-05	0.00E+00	7.18E-05	7.18E-05	6.36E-01	1.43E-05	1.00E-04
Bridge Attachments	150	4	30	HHDT	4.29E-03	6.72E-02	4.85E-02	9.78E-05	0.00E+00	1.93E-04	1.93E-04	0.00E+00	1.85E-04	1.85E-04	1.04E+01	1.99E-04	1.63E-03
Bridge Attachments	150	4	30	LHDT2	7.69E-05	1.76E-03	6.38E-04	1.50E-06	0.00E+00	1.88E-05	1.88E-05	0.00E+00	1.80E-05	1.80E-05	1.59E-01	3.57E-06	2.50E-05
Blowing/Splicing	102	4	30	LHDT2	2.31E-04	5.28E-03	1.91E-03	4.51E-06	0.00E+00	5.63E-05	5.63E-05	0.00E+00	5.39E-05	5.39E-05	4.77E-01	1.07E-05	7.50E-05
					<b>2.91E-02</b>	<b>4.64E-01</b>	<b>3.25E-01</b>	<b>6.59E-04</b>	<b>0.00E+00</b>	<b>1.54E-03</b>	<b>1.54E-03</b>	<b>0.00E+00</b>	<b>1.48E-03</b>	<b>1.48E-03</b>	<b>6.98E+01</b>	<b>1.35E-03</b>	<b>1.10E-02</b>

Notes:

Emission factors from CARB's EMFAC2017, Lassen County, Calendar Year 2020; LHDT2 & HHDT; Diesel

**Grading Emissions**

								Emission Factor (lb/VMT) <sup>2</sup>		Emissions (lb/day) <sup>3</sup>	
Phase	CalEEMod Equipment Type	Acres/8hr-day per Equipment Type	Quantity <sup>1</sup>	Hours per Day	Scaling Factor	Total Acres/8hr-day	VMT	PM10	PM2.5	PM10	PM2.5
Plowing In Method	Crawler Tractors	0.5	3	10	8	1.875	1.289	1.54	0.17	0.78	0.08
Plowing In Method	Excavators	0	6	10	8	0	0	1.54	0.17	0.00	0.00
Plowing In Method	Off-Highway Trucks	0	3	10	8	0	0	1.54	0.17	0.00	0.00
Plowing In Method	Tractors/Loaders/Backhoes	0	3	10	8	0	0	1.54	0.17	0.00	0.00
Open Trenching	Excavators	0	4	10	8	0	0	1.54	0.17	0.00	0.00
Open Trenching	Tractors/Loaders/Backhoes	0	4	10	8	0	0	1.54	0.17	0.00	0.00
Directional Boring	Bore/Drill Rigs	0	4	10	8	0	0	1.54	0.17	0.00	0.00
Directional Boring	Tractors/Loaders/Backhoes	0	4	10	8	0	0	1.54	0.17	0.00	0.00
Bridge Attachments	Excavators	0	1	10	8	0	0	1.54	0.17	0.00	0.00
Blowing/Splicing	Air Compressors	0	6	10	8	0	0	1.54	0.17	0.00	0.00

Equipment Type	Acres/8-hr day
Crawler Tractors	0.5
Graders	0.5
Rubber Tired Dozers	0.5
Scrapers	1

**Notes:**

- 1) Information provided from applicant
- 2) Emission factor based on CalEEMod Methodology
- 3) Includes dust reduction measure consistent with CalEEMod methods. Watering 3x per day, 61 percent reduction



**Grading Emissions**EFP<sub>M15</sub>

EF Emission Factor (lb/VMT)  
 S mean vehicle speed (mph), AP-42 Default: 7.1 mph  
 F<sub>PM2.5</sub> PM2.5 scaling factor, AP-42 default: 0.031  
 F<sub>PM10</sub> PM10 scaling factor, AP-42 default: 0.6

S 7.1

F<sub>PM2.5</sub> 0.031F<sub>PM10</sub> 0.6EF<sub>PM15</sub> 2.57EF<sub>TSP</sub> 5.37**Emission Factor (lb/VMT)**EF<sub>PM10</sub> 1.543EF<sub>PM2.5</sub> 0.167**Emissions= EF x VMT**

VMT:

A<sub>site</sub> acreage of grading site  
 W<sub>b</sub> Width of blade, default: 12 feet  
 Feet/acre conversion 43560  
 feet/mile conversion 5280  
 Acres per 8-hr day amount of acres graded per day, see calc below

Parameters:	Value
A <sub>site</sub>	
W <sub>b</sub>	12
Feet/acre conversion	43560
feet/mile conversion	5280
Acres per 8-hr day	1.875
<b>VMT</b>	<b>1.2890625</b>

**Acres per 8-hr day**

Equipment Type	Acres/8-hr day	# of equipment	Equipment Hours per day	Scaling Factor	Acres per day
Crawler Tractors	0.5	3	10	8	1.875
Graders	0.5	0	10	8	0
Rubber Tired Dozers	0.5	0	10	8	0
Scrapers	1	0	10	8	0

**1.875**

Zayo Prineville to Reno Fiber-Optic Installation - Lassen County APCD Air District, Summer

**Zayo Prineville to Reno Fiber-Optic Installation**  
**Lassen County APCD Air District, Summer**

**1.0 Project Characteristics**

**1.1 Land Usage**

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	5.00	1000sqft	0.11	5,000.00	0

**1.2 Other Project Characteristics**

<b>Urbanization</b>	Urban	<b>Wind Speed (m/s)</b>	2.2	<b>Precipitation Freq (Days)</b>	56
<b>Climate Zone</b>	14			<b>Operational Year</b>	2021
<b>Utility Company</b>	Pacific Gas & Electric Company				
<b>CO2 Intensity (lb/MWhr)</b>	641.35	<b>CH4 Intensity (lb/MWhr)</b>	0.029	<b>N2O Intensity (lb/MWhr)</b>	0.006

**1.3 User Entered Comments & Non-Default Data**

Project Characteristics -  
 Land Use -

Table Name	Column Name	Default Value	New Value
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	11.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	11.00
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstructionPhase	NumDays	1.00	139.00
tblConstructionPhase	NumDays	1.00	39.00
tblConstructionPhase	NumDays	1.00	150.00
tblConstructionPhase	NumDays	1.00	150.00
tblConstructionPhase	NumDays	1.00	102.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	3.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	4.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblTripsAndVMT	WorkerTripNumber	38.00	0.00
tblTripsAndVMT	WorkerTripNumber	20.00	0.00
tblTripsAndVMT	WorkerTripNumber	20.00	0.00
tblTripsAndVMT	WorkerTripNumber	3.00	0.00
tblTripsAndVMT	WorkerTripNumber	15.00	0.00



### 3.0 Construction Detail

#### Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Plowing In Method	Site Preparation	6/1/2020	12/10/2020	5	139	
2	Open Trenching	Site Preparation	6/1/2020	7/23/2020	5	39	
3	Directional Boring	Site Preparation	6/1/2020	12/27/2020	5	150	
4	Bridge Attachments	Site Preparation	6/1/2020	12/27/2020	5	150	
5	Blowing/Splicing	Site Preparation	8/12/2020	12/31/2020	5	102	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural

#### OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Plowing In Method	Crawler Tractors	3	10.00	212	0.43
Plowing In Method	Excavators	6	10.00	158	0.38
Plowing In Method	Off-Highway Trucks	3	10.00	402	0.38
Plowing In Method	Tractors/Loaders/Backhoes	3	10.00	97	0.37
Open Trenching	Excavators	4	10.00	158	0.38
Open Trenching	Tractors/Loaders/Backhoes	4	10.00	97	0.37
Directional Boring	Bore/Drill Rigs	4	10.00	221	0.50
Directional Boring	Tractors/Loaders/Backhoes	4	10.00	97	0.37
Bridge Attachments	Excavators	1	10.00	158	0.38
Blowing/Splicing	Air Compressors	6	10.00	78	0.48

## Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Plowing In Method	15	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Open Trenching	8	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Directional Boring	8	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Bridge Attachments	1	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Blowing/Splicing	6	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

### 3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

**3.2 Plowing In Method - 2020**  
**Unmitigated Construction On-Site**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.9885	0.0000	1.9885	0.2147	0.0000	0.2147			0.0000			0.0000
Off-Road	7.2804	77.6281	56.7202	0.1294		3.2920	3.2920		3.0286	3.0286		12,525.0591	12,525.0591	4.0509		12,626.3305
<b>Total</b>	<b>7.2804</b>	<b>77.6281</b>	<b>56.7202</b>	<b>0.1294</b>	<b>1.9885</b>	<b>3.2920</b>	<b>5.2805</b>	<b>0.2147</b>	<b>3.0286</b>	<b>3.2433</b>		<b>12,525.0591</b>	<b>12,525.0591</b>	<b>4.0509</b>		<b>12,626.3305</b>

**Unmitigated Construction Off-Site**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
<b>Total</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>

**Mitigated Construction On-Site**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e	
Category	lb/day										lb/day						
Fugitive Dust					1.9885	0.0000	1.9885	0.2147	0.0000	0.2147			0.0000				0.0000
Off-Road	1.5869	6.8765	73.6595	0.1294		0.2116	0.2116		0.2116	0.2116	0.0000	12,525.0591	12,525.0591	4.0509			12,626.3305
<b>Total</b>	<b>1.5869</b>	<b>6.8765</b>	<b>73.6595</b>	<b>0.1294</b>	<b>1.9885</b>	<b>0.2116</b>	<b>2.2001</b>	<b>0.2147</b>	<b>0.2116</b>	<b>0.4263</b>	<b>0.0000</b>	<b>12,525.0591</b>	<b>12,525.0591</b>	<b>4.0509</b>			<b>12,626.3305</b>

**Mitigated Construction Off-Site**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e	
Category	lb/day										lb/day						
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000			0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000			0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000			0.0000
<b>Total</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>			<b>0.0000</b>



### 3.3 Open Trenching - 2020

#### Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	2.2724	22.5889	27.7375	0.0414		1.2499	1.2499		1.1499	1.1499		4,004.4346	4,004.4346	1.2951		4,036.8125
<b>Total</b>	<b>2.2724</b>	<b>22.5889</b>	<b>27.7375</b>	<b>0.0414</b>	<b>0.0000</b>	<b>1.2499</b>	<b>1.2499</b>	<b>0.0000</b>	<b>1.1499</b>	<b>1.1499</b>		<b>4,004.4346</b>	<b>4,004.4346</b>	<b>1.2951</b>		<b>4,036.8125</b>

#### Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
<b>Total</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>

**Mitigated Construction On-Site**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.5076	2.1995	31.3004	0.0414		0.0677	0.0677		0.0677	0.0677	0.0000	4,004.4346	4,004.4346	1.2951		4,036.8125
<b>Total</b>	<b>0.5076</b>	<b>2.1995</b>	<b>31.3004</b>	<b>0.0414</b>	<b>0.0000</b>	<b>0.0677</b>	<b>0.0677</b>	<b>0.0000</b>	<b>0.0677</b>	<b>0.0677</b>	<b>0.0000</b>	<b>4,004.4346</b>	<b>4,004.4346</b>	<b>1.2951</b>		<b>4,036.8125</b>

**Mitigated Construction Off-Site**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
<b>Total</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>

**3.4 Directional Boring - 2020**  
**Unmitigated Construction On-Site**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	2.4351	28.1370	21.8023	0.0625		1.1730	1.1730		1.0792	1.0792		6,052.8769	6,052.8769	1.9576		6,101.8175
<b>Total</b>	<b>2.4351</b>	<b>28.1370</b>	<b>21.8023</b>	<b>0.0625</b>	<b>0.0000</b>	<b>1.1730</b>	<b>1.1730</b>	<b>0.0000</b>	<b>1.0792</b>	<b>1.0792</b>		<b>6,052.8769</b>	<b>6,052.8769</b>	<b>1.9576</b>		<b>6,101.8175</b>

**Unmitigated Construction Off-Site**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
<b>Total</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>

**Mitigated Construction On-Site**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.7746	3.3564	33.1481	0.0625		0.1033	0.1033		0.1033	0.1033	0.0000	6,052.8769	6,052.8769	1.9576		6,101.8175
<b>Total</b>	<b>0.7746</b>	<b>3.3564</b>	<b>33.1481</b>	<b>0.0625</b>	<b>0.0000</b>	<b>0.1033</b>	<b>0.1033</b>	<b>0.0000</b>	<b>0.1033</b>	<b>0.1033</b>	<b>0.0000</b>	<b>6,052.8769</b>	<b>6,052.8769</b>	<b>1.9576</b>		<b>6,101.8175</b>

**Mitigated Construction Off-Site**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
<b>Total</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>

### 3.5 Bridge Attachments - 2020

#### Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e	
Category	lb/day										lb/day						
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000				0.0000
Off-Road	0.3062	3.0158	4.0848	6.4600e-003		0.1461	0.1461		0.1344	0.1344		625.1480	625.1480	0.2022			630.2027
<b>Total</b>	<b>0.3062</b>	<b>3.0158</b>	<b>4.0848</b>	<b>6.4600e-003</b>	<b>0.0000</b>	<b>0.1461</b>	<b>0.1461</b>	<b>0.0000</b>	<b>0.1344</b>	<b>0.1344</b>		<b>625.1480</b>	<b>625.1480</b>	<b>0.2022</b>			<b>630.2027</b>

#### Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e	
Category	lb/day										lb/day						
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000			0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000			0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000			0.0000
<b>Total</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>			<b>0.0000</b>

**Mitigated Construction On-Site**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.0794	0.3442	4.8975	6.4600e-003		0.0106	0.0106		0.0106	0.0106	0.0000	625.1480	625.1480	0.2022		630.2027
<b>Total</b>	<b>0.0794</b>	<b>0.3442</b>	<b>4.8975</b>	<b>6.4600e-003</b>	<b>0.0000</b>	<b>0.0106</b>	<b>0.0106</b>	<b>0.0000</b>	<b>0.0106</b>	<b>0.0106</b>	<b>0.0000</b>	<b>625.1480</b>	<b>625.1480</b>	<b>0.2022</b>		<b>630.2027</b>

**Mitigated Construction Off-Site**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
<b>Total</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>

**3.6 Blowing/Splicing - 2020**  
**Unmitigated Construction On-Site**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	2.4218	16.8384	18.3142	0.0297		1.1094	1.1094		1.1094	1.1094		2,814.4805	2,814.4805	0.2179		2,819.9282
<b>Total</b>	<b>2.4218</b>	<b>16.8384</b>	<b>18.3142</b>	<b>0.0297</b>	<b>0.0000</b>	<b>1.1094</b>	<b>1.1094</b>	<b>0.0000</b>	<b>1.1094</b>	<b>1.1094</b>		<b>2,814.4805</b>	<b>2,814.4805</b>	<b>0.2179</b>		<b>2,819.9282</b>

**Unmitigated Construction Off-Site**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
<b>Total</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>

**Mitigated Construction On-Site**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	2.4218	16.8384	18.3142	0.0297		1.1094	1.1094		1.1094	1.1094	0.0000	2,814.4805	2,814.4805	0.2179		2,819.9282
<b>Total</b>	<b>2.4218</b>	<b>16.8384</b>	<b>18.3142</b>	<b>0.0297</b>	<b>0.0000</b>	<b>1.1094</b>	<b>1.1094</b>	<b>0.0000</b>	<b>1.1094</b>	<b>1.1094</b>	<b>0.0000</b>	<b>2,814.4805</b>	<b>2,814.4805</b>	<b>0.2179</b>		<b>2,819.9282</b>

**Mitigated Construction Off-Site**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
<b>Total</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>



Zayo Prineville to Reno Fiber-Optic Installation - Lassen County APCD Air District, Annual

**Zayo Prineville to Reno Fiber-Optic Installation  
Lassen County APCD Air District, Annual**

**1.0 Project Characteristics**

**1.1 Land Usage**

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	5.00	1000sqft	0.11	5,000.00	0

**1.2 Other Project Characteristics**

<b>Urbanization</b>	Urban	<b>Wind Speed (m/s)</b>	2.2	<b>Precipitation Freq (Days)</b>	56
<b>Climate Zone</b>	14			<b>Operational Year</b>	2021
<b>Utility Company</b>	Pacific Gas & Electric Company				
<b>CO2 Intensity (lb/MWhr)</b>	641.35	<b>CH4 Intensity (lb/MWhr)</b>	0.029	<b>N2O Intensity (lb/MWhr)</b>	0.006

**1.3 User Entered Comments & Non-Default Data**

Project Characteristics -

Land Use -

Table Name	Column Name	Default Value	New Value
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	11.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	11.00
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstructionPhase	NumDays	1.00	139.00
tblConstructionPhase	NumDays	1.00	39.00
tblConstructionPhase	NumDays	1.00	150.00
tblConstructionPhase	NumDays	1.00	150.00
tblConstructionPhase	NumDays	1.00	102.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	3.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	4.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblTripsAndVMT	WorkerTripNumber	38.00	0.00
tblTripsAndVMT	WorkerTripNumber	20.00	0.00
tblTripsAndVMT	WorkerTripNumber	20.00	0.00
tblTripsAndVMT	WorkerTripNumber	3.00	0.00
tblTripsAndVMT	WorkerTripNumber	15.00	0.00

## 2.0 Emissions Summary

### 2.1 Overall Construction

#### Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.8794	9.0309	7.3585	0.0165	0.1382	0.4087	0.5469	0.0149	0.3805	0.3954	0.0000	1,445.1167	1,445.1167	0.4354	0.0000	1,456.0004
Maximum	0.8794	9.0309	7.3585	0.0165	0.1382	0.4087	0.5469	0.0149	0.3805	0.3954	0.0000	1,445.1167	1,445.1167	0.4354	0.0000	1,456.0004

#### Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.3077	1.6571	9.5171	0.0165	0.1382	0.0811	0.2193	0.0149	0.0811	0.0961	0.0000	1,445.1150	1,445.1150	0.4354	0.0000	1,455.9986
Maximum	0.3077	1.6571	9.5171	0.0165	0.1382	0.0811	0.2193	0.0149	0.0811	0.0961	0.0000	1,445.1150	1,445.1150	0.4354	0.0000	1,455.9986

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction	65.01	81.65	-29.34	0.00	0.00	80.15	59.89	0.00	78.68	75.71	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	6-1-2020	8-31-2020	4.5117	0.6165
2	9-1-2020	9-30-2020	1.4792	0.3458
		Highest	4.5117	0.6165

### 3.0 Construction Detail

#### Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Plowing In Method	Site Preparation	6/1/2020	12/10/2020	5	139	
2	Open Trenching	Site Preparation	6/1/2020	7/23/2020	5	39	
3	Directional Boring	Site Preparation	6/1/2020	12/27/2020	5	150	
4	Bridge Attachments	Site Preparation	6/1/2020	12/27/2020	5	150	
5	Blowing/Splicing	Site Preparation	8/12/2020	12/31/2020	5	102	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

#### OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Plowing In Method	Crawler Tractors	3	10.00	212	0.43
Plowing In Method	Excavators	6	10.00	158	0.38
Plowing In Method	Off-Highway Trucks	3	10.00	402	0.38
Plowing In Method	Tractors/Loaders/Backhoes	3	10.00	97	0.37
Open Trenching	Excavators	4	10.00	158	0.38
Open Trenching	Tractors/Loaders/Backhoes	4	10.00	97	0.37
Directional Boring	Bore/Drill Rigs	4	10.00	221	0.50
Directional Boring	Tractors/Loaders/Backhoes	4	10.00	97	0.37
Bridge Attachments	Excavators	1	10.00	158	0.38
Blowing/Splicing	Air Compressors	6	10.00	78	0.48

## Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Plowing In Method	15	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Open Trenching	8	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Directional Boring	8	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Bridge Attachments	1	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Blowing/Splicing	6	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

### 3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment























## **Energy**

During construction activities, diesel fuel would be consumed by offroad equipment and mobile sources (workers and trucks). Fuel consumption from these sources were estimated for the entire construction duration.

### ***Offroad Equipment***

Total Fuel Consumption = # of Equipment x Daily Usage x Horsepower x Load Factor x Total # of Days x Fuel Consumption Factor

- Total Fuel Consumption = gallons
- # of Equipment = unitless
- Daily usage = hours/day
- Horsepower = hp
- Load Factor = unitless
- Total # of Days = days
- Fuel Consumption Factor = gal/hp-hr = BSFC/Fuel Density
  - Brake specific fuel consumption (BSFC) = lb/hp-hr
  - Fuel density = lb/gal

### ***Mobile Sources***

Worker vehicles and trucks would consume diesel fuel during onroad travel and idling. The calculation method is provided below.

#### ***Onroad Travel***

Total Fuel Consumption = # of Truck Trips/day x Trip Length x Total # of Days x Fuel Consumption Factor

- Total Fuel Consumption = gallons
- # of Truck Trips per day = trips/day
- Trip Length = miles/trip
- Total # of Days = days
- Fuel Consumption Factor = gallon/mile

#### ***Idling***

Total Fuel Consumption = # of Truck Trips/day x Total # of Days x Total Idling Time x Fuel Consumption Factor

- Total Fuel Consumption = gallons
- # of Truck Trips per day = trips/day
- Total # of Days = days
- Total Idling Time = hours/trip
- Fuel Consumption Factor = gallon/hour



**Fuel Consumption Summary**

Source Category	Fuel Consumption (gal)	
	Diesel	Gasoline
Offroad Equipment	159,384	0
Heavy Duty Trucks	20,257	0
Worker Trucks	14,134	0
<b>Total Fuel Consumption</b>	<b>193,775</b>	<b>0</b>

**Lassen County Fuel Consumption (2018)<sup>1</sup>**

Source	Fuel Type	Gallons (Retail + Non- Retail)		Percent of Project Compared to County
		Retail	Non-Retail	
Off-Road/HHDT/LHDT2	Diesel	2,083,333.33		9.301%

## Notes:

- California Energy Commission, California Annual Retail Fuel Outlet Report Results (CEC-A15), 2018  
[https://ww2.energy.ca.gov/almanac/transportation\\_data/gasoline/piira\\_retail\\_survey.html](https://ww2.energy.ca.gov/almanac/transportation_data/gasoline/piira_retail_survey.html)  
[https://ww2.energy.ca.gov/almanac/transportation\\_data/gasoline/2010-2018\\_A15\\_Results\\_ada.xlsx](https://ww2.energy.ca.gov/almanac/transportation_data/gasoline/2010-2018_A15_Results_ada.xlsx)  
 Accessed May 2020. Diesel is adjusted to account for retail (48%) and non-retail (52%) diesel sales

**Off-Road Equipment**

<b>Fuel Consumption: Equipment ≤ 100HP</b>		<b>Value</b>
Brake Specific Fuel Consumption Factor (lb/hp-hr) <sup>1</sup>		0.408
Fuel Density (lb/gal) <sup>1</sup>		7.11
Consumption Factor (gal/hp-hr)		0.0574
Total HP-HR <100		650,123
<b>Total Diesel Fuel (gal)</b>		<b>37,312</b>

<b>Fuel Consumption: Equipment &gt; 100HP</b>		<b>Value</b>
Brake Specific Fuel Consumption Factor (lb/hp-hr) <sup>1</sup>		0.367
Fuel Density (lb/gal) <sup>1</sup>		7.11
Consumption Factor (gal/hp-hr)		0.0516
Total HP-HR >100		2,364,602
<b>Total Diesel Fuel (gal)</b>		<b>122,072</b>

**Total diesel gallons (off-road equipment): 159,384**

<b>Construction Phase</b>	<b>Equipment</b>	<b># of Equipment</b>	<b>Hours/Day</b>	<b>HP</b>	<b>Load</b>	<b>Days</b>	<b>Total HP-HR</b>
Plowing In Method	Crawler Tractors	3	10	212	0.43	139	380,137
Plowing In Method	Excavators	6	10	158	0.38	139	500,734
Plowing In Method	Off-Highway Trucks	3	10	402	0.38	139	637,009
Plowing In Method	Tractors/Loaders/Backhoes	3	10	97	0.37	139	149,661
Open Trenching	Excavators	4	10	158	0.38	39	93,662
Open Trenching	Tractors/Loaders/Backhoes	4	10	97	0.37	39	55,988
Directional Boring	Bore/Drill Rigs	4	10	221	0.5	150	663,000
Directional Boring	Tractors/Loaders/Backhoes	4	10	97	0.37	150	215,340
Bridge Attachments	Excavators	1	10	158	0.38	150	90,060
Blowing/Splicing	Air Compressors	6	10	78	0.48	102	229,133
<b>Total &gt;100HP</b>							<b>2,364,602</b>
<b>Total &lt;100HP</b>							<b>650,123</b>

Notes:

1. CARB, 2017 Off-road Diesel Emission Factors

[https://ww3.arb.ca.gov/msei/ordiesel/ordas\\_ef\\_fcf\\_2017\\_v7.xlsx](https://ww3.arb.ca.gov/msei/ordiesel/ordas_ef_fcf_2017_v7.xlsx)

**HHDT Trucks**

<b>Onroad Travel Consumption</b>		<b>Value</b>
EMFAC2017 Diesel Fuel Consumption Factor (gal/mi): <sup>1</sup>		0.1757
Total VMT (mi):		115,020
<b>Total diesel gallons</b>		<b>20,209</b>
<b>Idling Consumption</b>		<b>Value</b>
Idling Fuel Consumption Factor (gal/hr): <sup>2</sup>		0.8400
Total Idle-Hours per Year:		160
<b>Total diesel gallons</b>		<b>48</b>

**Total diesel gallons: 20,257**

<b>Construction Activity</b>	<b>Total Workdays</b>	<b># of Truck Trips/day</b>	<b>Trip Length (miles)</b>	<b>EMFAC Vehicle Category</b>	<b>VMT</b>	<b>Idle Hours</b>
Plowing In Method	139	6	30	HHDT	25,020	70
Directional Boring	150	16	30	HHDT	72,000	200
Bridge Attachments	150	4	30	HHDT	18,000	50
				<b>Total VMT:</b>	<b>115,020</b>	
				<b>Total Idle-Hours:</b>		<b>160</b>

1. CARB, EMFAC2017 (Lassen APCD; HHDT; Annual; CY 2020; Aggregate MY; Aggregate Speed,DSL)
2. Department of Energy, Fact #861, 2015 Idle Fuel Consumption for Selected Gasoline and Diesel Vehicles, February 23, 2015.  
<https://www.energy.gov/eere/vehicles/fact-861-february-23-2015-idle-fuel-consumption-selected-gasoline-and-diesel-vehicles>

**LHDT2 Trucks**

<b>Onroad Travel Consumption</b>		<b>Value</b>
EMFAC2017 Diesel Fuel Consumption Factor (gal/mi): <sup>1</sup>		0.0651
Total VMT (mi):		215,820
<b>Total diesel gallons</b>		<b>14,043</b>
<b>Idling Consumption</b>		<b>Value</b>
Idling Fuel Consumption Factor (gal/hr): <sup>2</sup>		0.8400
Total Idle-Hours per Year:		300
<b>Total diesel gallons</b>		<b>91</b>

**Total diesel gallons: 14,134**

<b>Construction Activity</b>	<b>Total Workdays</b>	<b># of Truck Trips/day</b>	<b>Trip Length (miles)</b>	<b>EMFAC Vehicle Category</b>	<b>VMT</b>	<b>Idle Hours</b>
Plowing In Method	139	18	30	LHDT2	75,060	209
Open Trenching	39	12	30	LHDT2	14,040	39
Directional Boring	150	16	30	LHDT2	72,000	200
Bridge Attachments	150	4	30	LHDT2	18,000	50
Blowing/Splicing	102	12	30	LHDT2	36,720	102
<b>Total VMT:</b>					<b>215,820</b>	
<b>Total Idle-Hours:</b>						<b>300</b>

1. CARB, EMFAC2017 (Lassen APCD; HHDT; Annual; CY 2020; Aggregate MY; Aggregate Speed,DSL)
2. Department of Energy, Fact #861, 2015 Idle Fuel Consumption for Selected Gasoline and Diesel Vehicles, February 23, 2015.  
<https://www.energy.gov/eere/vehicles/fact-861-february-23-2015-idle-fuel-consumption-selected-gasoline-and-diesel-vehicles>

**Mobile Trip Summary**

<b>Construction Activity</b>	<b>Total Workdays</b>	<b># of Truck Trips/day</b>	<b>Trip Length (miles)</b>	<b>EMFAC Vehicle Category</b>
Plowing In Method	139	6	30	HHDT
Directional Boring	150	16	30	HHDT
Bridge Attachments	150	4	30	HHDT
Plowing In Method	139	18	30	LHDT2
Open Trenching	39	12	30	LHDT2
Directional Boring	150	16	30	LHDT2
Bridge Attachments	150	4	30	LHDT2
Blowing/Splicing	102	12	30	LHDT2

Region	LASSEN COUNTY APCD
Vehicle Category	HHDT
Model Year	Aggregated
Speed	Aggregated
Calendar Year	2020
Fuel	DSL

<b>Sum of VMT</b>	<b>Sum of Fuel Consumption</b>
9120.325442	1.602454098

**HHDT Fuel Consumption Factor**

<b>VMT (mi/day)</b>	<b>Fuel Consumption (1000gal/day)</b>	<b>Fuel Consumption Rate (gal/mi)</b>	<b>Fuel Economy (mi/gal)</b>
9120.325442	1.6025	0.1757	5.6915

Region	LASSEN COUNTY APCD
Vehicle Category	LHDT2
Model Year	Aggregated
Speed	Aggregated
Calendar Year	2020
Fuel	DSL

Sum of VMT	Sum of Fuel Consumption
17066.05188	1.110468878

**LHDT2 Fuel Consumption Factor**

VMT (mi/day)	Fuel Consumption (1000gal/day)	Fuel Consumption Rate (gal/mi)	Fuel Economy (mi/gal)
17066.05188	1.1105	0.0651	15.3683

**Idling Fuel Consumption Factors**

Column1	Column2	Column3	Column4	Column5
VEHICLE TYPE	FUEL TYPE	ENGINE SIZE (LITER)	GROSS VEHICLE WEIGHT (GVW) (LBS)	IDLING FUEL USE (GAL/HR WITH NO LOAD)
Compact Sedan	Gas	2	-	0.16
Large Sedan	Gas	4.6	-	0.39
Compact Sedan	Diesel	2	-	0.17
Medium Heavy Truck	Gas	7-May	19,700-26,000	0.84
Delivery Truck	Diesel	-	19,500	0.84
Tow Truck	Diesel	-	26,000	0.59
Medium Heavy Truck	Diesel	10-Jun	23,000-33,000	0.44
Transit Bus	Diesel	-	30,000	0.97
Combination Truck	Diesel	-	32,000	0.49
Bucket Truck	Diesel	-	37,000	0.9
Tractor-Semitrailer	Diesel	-	80,000	0.64

Department of Energy, Fact #861, 2015 Idle Fuel Consumption for Selected Gasoline and Diesel Vehicles, February 23, 2015.

<https://www.energy.gov/eere/vehicles/fact-861-february-23-2015-idle-fuel-consumption-selected-gasoline-and-diesel-vehicles>